WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION
WASHINGTON STATE FERRIES, Terminal Engineering and Construction
SEATTLE, WA 98104

March 17, 2004

ATTENTION: ALL BIDDERS AND PLANHOLDERS

Friday Harbor Ferry Terminal Preservation Project

Washington State Ferries

ADDENDUM NO. 5

You are notified that the Specification for the above referenced project are amended as follows:

Special Provisions

1. The following Special Provision is added:

(******)

PERMANENT TRANSFER SPAN MECHANICAL AND CONTROLS INTEGRATION

Description

This work consists of mechanical and controls system integration, making the mechanical system operate in accordance with the Plans and Special Provisions and performing operational testing for the transfer span. There shall be a single person responsible for mechanical and controls integration. The Contractor shall appoint a Test Coordinator to coordinate and supervise the testing, verify all components are compatible and if necessary, recommend modifications to the Engineer.

This series of tests included in this subsection for the permanent span are to be conducted twice. Once at the existing transfer span storage facility and a second time after the transfer span has been re-assembled at the new Friday Harbor facility.

Scope of Testing

It is the intent of these tests to assure all electrical and mechanical equipment is operational within industry and manufacturers' tolerances and is installed in accordance with the design specifications.

The test procedures included in this special provision are intended to show the extent of the testing required for operational testing of the permanent transfer span. Final test procedures shall be determined and made available to the Contractor once all component testing has been completed.

These tests are based on the equipment specified in these special provisions and plans. The Contractor shall provide tests equal to these tests specific to the equipment substituted from these special provisions and plans.

Preliminary Testing Submittal
Prior to commencement of testing, the Test Coordinator shall submit the following:

1. Test Coordinator has reviewed the site conditions and verified that the tests and conditions as outlined in this Special Provision can be completed.

2. The Test Coordinator has verified all tests and conditions have been completed and signed off on the “Mechanical and Controls Integration Operational Test Pretest Checklist.

3. The name of the person responsible for conducting the testing.

Operational Testing - Mechanical and Controls Integration
Testing of the transfer span and apron mechanical and electrical systems shall be completed as described below. Installation of the entire mechanical, hydraulic, control and electrical systems shall be completed prior to testing. The general test requirements listed in the hydraulic section shall apply to this test.

The contractor shall ensure that the required craftsmen are available through out the test for adjustments, measurements and relocations to ensure a smooth continuous testing operation.

The transfer span control system shall be in the following condition prior to starting the Operational Testing and shall be included as part of the transfer span check off list:

1. The PLC cabinet is installed and fully functional on its normal power supply (TS-T1).

2. The hydraulic cylinders are installed and connected to the hydraulic system and the pins in and out limit switches connected to the PLC.

3. The Bridge motors installed and normal power to the Bridge motors (MCP).

4. The HPU system fully installed normal power to the HPU (MCP).

5. The apron initial speed adjustment is completed as described in the Special Provision **HYDRAULIC SYSTEM FOR VEHICLE TRANSFER SPANS**

6. The Hanger bar audible alarms (1AS, 2AS) installed.

7. Hanger bar and bridge proximity and limit switches installed and connected to the PLC.

8. The Hoist and Counterweight System Functional Test and Testing completed.

9. Provisions for transferring the apron weight to simulate an apron float condition are available.

10. The LCI 100 and load links fully installed.

11. The Motor Control Panel is installed and fully functional.

12. All brakes are installed and fully functional.

13. The Line control set points set at: low/low tension 50 pounds, low tension 500 pounds high tension 2300 lbs

14. All temporary power installed and available as outlined in the Special Provision **TEST ASSEMBLY**

15. All miscellaneous electrical equipment (fog horn, work lights, cargo lights, navigation lights etc.) are installed and fully functional.

The following test shall be conducted after the transfer span mechanical and electrical systems have been completed as outlined above.

The contractor shall provide adequate support personnel and equipment during the following test to make system adjustments and repeat any steps that require adjustment. A three phase amp meter shall be required to measure three phase motor current for Hoist up and down measurements.

WSF will make all PLC programming adjustments as required for the specified equipment.

Note: The number of cycles for each test shall be the number of successful cycles after the last adjustment.

Prior to starting the following test the contractor shall open all motor disconnects and conduct the test steps of the following procedure to verify that the correct motor starters and relays are energized for the given command.

OPERATIONAL TESTING PROCEDURE
Washington State Ferries
WSDOT Contract No. 6737
Friday Harbor Transfer Span

Location:_____
Date: :_____

Attendees			
Name	Initials	Organization	Duties

The following input and output tables show the initial input and output configuration of the PLC with the transfer span in its "Initial Setup" and the "Normal" on condition of the control system. The "Normal" condition of the system is with control power On and all levels, pressures, and physical positions (pins extended, span position) within normal operating limits. The apron is considered "Stowed", with the Live Load Pins extended, and with the span at mid travel. The initial inputs and outputs shall be verified prior to proceeding with the Mechanical and Controls Integration Operational Test.

Rack 1 - Slot 1

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	1/00		X	I:1/0	111LB	Emergency Stop
I	1/01	X		I:1/1	112PB	Raise Transfer Span
I	1/02	X		I:1/2	113PB	Lower Transfer Span
I	1/03	X		I:1/3	114PB	Apron Up
I	1/04	X		I:1/4	115PB	Apron Down
I	1/05	X		I:1/5	116PB	Retract Live Load Pins
I	1/06	X		I:1/6	117PB	Extend Live Load Pins
I	1/07	X		I:1/7	118PB	Alarm Silence
I	1/08	X		I:1/8	1PS	Apron Float
I	1/09		X	I:1/9	1FS	Oil Low Level
I	1/10	X		I:1/10	F1	High Pressure Filter Clogged
I	1/11	X		I:1/11	F2	Return Filter Clogged
I	1/12	X		I:1/12	47PB	HPU Local Start
I	1/13		X	I:1/13	48PB	HPU Local Stop
I	1/14	X		I:1/14	37PB	Remote Apron Up
I	1/15	X		I:1/15	38PB	Remote Apron Down

Rack 1 - Slot 2

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	2/00		**X**	I:2/0	6LS	Left Hanger Upper Limit
I	2/01		**X**	I:2/1	7LS	Right Hanger Upper Limit
I	2/02		**X**	I:2/2	8LS	Left Hanger Alarm Limit
I	2/03		**X**	I:2/3	9LS	Right Hanger Alarm Limit
I	2/04	**X**		I:2/4	1LS	Right LLP Out
I	2/05		**X**	I:2/5	2LS	Right LLP In
I	2/06	**X**		I:2/6	3LS	Left LLP Out
I	2/07		**X**	I:2/7	4LS	Left LLP In
I	2/08	**X**		I:2/8	14LS	Right High Proximity
I	2/09	**X**		I:2/9	15LS	Right Mid Proximity
I	2/10		**X**	I:2/10	16LS	Right Low Proximity
I	2/11	**X**		I:2/11	17LS	Left High Proximity
I	2/12	**X**		I:2/12	18LS	Left Mid Proximity
I	2/13		**X**	I:2/13	19LS	Left Low Proximity
I	2/14		**X**	I:2/14	10LS	Bridge High Limit
I	2/15	**X**		I:2/15		Spare

Rack 1 - Slot 3

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	3/00		X	I:3/0	LCI-1C	Right Cable High Tension
I	3/01	X		I:3/1	LCI-2C	Right Cable Low Tension
I	3/02	X		I:3/2	LCI-3C	Right Cable Low/Low Tension
I	3/03		X	I:3/3	LCI-4C	Left Cable High Tension
I	3/04	X		I:3/4	LCI-5C	Left Cable Low Tension
I	3/05	X		I:3/5	LCI-6C	Left Cable Low/Low Tension
I	3/06		X	I:3/6	LCI-WD	LCI Status Monitor
I	3/07	X		I:3/7		Spare
I	3/08		X	I:3/8	1CB(a)	Hpu Power Available
I	3/09		X	I:3/9	1OL	HPU OL Normal
I	3/10		X	I:3/10	B1CB(a)	Brake #1,3 Pwr Available
I	3/11		X	I:3/11	B1OL	Brake #1 OL Normal
I	3/12		X	I:3/12	B3OL	Brake #3 OL Normal
I	3/13		X	I:3/13	B2CB(a)	Brake #2&4 PWR Available
I	3/14		X	I:3/14	B2OL	Brake #2 OL Normal
I	3/15		X	I:3/15	B4OL	Brake #4 OL Normal

Rack 1 - Slot 4

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	4/00	X		I:4/0	11LS	Brake #1 Set
I	4/01	X		I:4/1	12LS	Brake #1 Release
I	4/02	X		I:4/2	13LS	Brake #1 Manual Set
I	4/03	X		I:4/3	21LS	Brake #2 Set
I	4/04	X		I:4/4	22LS	Brake #2 Release
I	4/05	X		I:4/5	23LS	Brake #2 Manual Set
I	4/06	X		I:4/6	31LS	Brake #3 Set
I	4/07	X		I:4/7	32LS	Brake #3 Release
I	4/08	X		I:4/8	33LS	Brake #3 Manual Set
I	4/09	X		I:4/9	41LS	Brake #4 Set
I	4/10	X		I:4/10	42LS	Brake #4 Release
I	4/11	X		I:4/11	43LS	Brake #4 Manual Set
I	4/12		X	I:4/12	2CB(a)	Motor M2 breaker Closed
I	4/13		X	I:4/13	2OL	Motor M2 OL Normal
I	4/14		X	I:4/14	3CB(a)	Motor M3 breaker Closed
I	4/15		X	I:4/15	3OL	Motor M3 OL Normal

Rack 1 - Slot 5

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	5/00	X		I:5/0		Spare
I	5/01	X		I:5/1		Spare
I	5/02	X		I:5/2		Spare
I	5/03	X		I:5/3		Spare
I	5/04	X		I:5/4		Spare
I	5/05	X		I:5/5		Spare
I	5/06	X		I:5/6	262/362ESS	Fog Horn Off
I	5/07	X		I:5/7	262/362ESS	Fog Horn On
I	5/08	X		I:5/8	261/361ESS	Fog Light Off
I	5/09	X		I:5/9	261/361ESS	Fog Light On
I	5/10	X		I:5/10	260/360ESS	HeadFrame Lights Off
I	5/11	X		I:5/11	260/360ESS	HeadFrame Lights On
I	5/12	X		I:5/12		Spare
I	5/13	X		I:5/13		Spare
I	5/14		X	I:5/14	ELK1	Vessel Power
I	5/15	X		I:5/15	ELK2	Shore Power

Rack 1 - Slot 6

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	6/00	X		I:6/0	RL2	Remote Activated
I	6/01	X		I:6/1	RL3	Remote Trouble
I	6/02	X		I:6/2	RL13	Remote Apron Up
I	6/03	X		I:6/3	RL12	Remote Apron Down
I	6/04	X		I:6/4	RL11	Spare
I	6/05	X		I:6/5	RL10	Spare
I	6/06	X		I:6/6	RL9	Spare
I	6/07	X		I:6/7	RL8	Spare
I	6/08	X		I:6/8	RL7	Spare
I	6/09	X		I:6/9	RL6	Spare
I	6/10	X		I:6/10	RL5	Spare
I	6/11	X		I:6/11	RL4	Spare
I	6/12	X		I:6/12		Spare
I	6/13	X		I:6/13	HPB12	H.F. Hoist Raise
I	6/14	X		I:6/14	HPB13	H.F. Hoist Lower
I	6/15		X	I:6/15	HPB11	H.F. Hoist Stop

Rack 1 - Slot 7

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
O	7/00	X		O:7/0	M1	HPU Motor Start
O	7/01	X		O:7/1	3MF	Bridge Hoist Motor M3 Raise
O	7/02	X		O:7/2	3MR	Bridge Hoist Motor M3 Lower
O	7/03	X		O:7/3	2MF	Bridge Hoist Motor M2 Raise
O	7/04	X		O:7/4	2MR	Bridge Hoist Motor M2 Lower
O	7/05	X		O:7/5	MB1	Brake #1&3 Set
O	7/06	X		O:7/6	MB2	Brake #2&4 Set
O	7/07	X		O:7/7	EC1	Right Cable Counter
O	7/08	X		O:7/8	EC2	Left Cable Counter
O	7/09	X		O:7/9	CR4	Spare
O	7/10	X		O:7/10	CR5	Spare
O	7/11	X		O:7/11		Spare
O	7/12	X		O:7/12	1SV	Retract LLP's
O	7/13	X		O:7/13	2SV	Extend LLP's
O	7/14	X		O:7/14	4SV	Raise Apron
O	7/15	X		O:7/15	5SV	Lower Apron

Rack 1 - Slot 8

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
O	8/00	**X**		O:8/0	1AS	Alarm Bell
O	8/01	**X**		O:8/1	CR9	Spare
O	8/02	**X**		O:8/2	3AS	Remote operation Strobe
O	8/03	**X**		O:8/3	2AS	Alarm Bell
O	8/04	**X**		O:8/4	11LB	Emergency Stop Indication
O	8/05	**X**		O:8/5	CR6	Spare
O	8/06	**X**		O:8/6	CR7	Spare
O	8/07	**X**		O:8/7	CR1	HeadFrame Light Control
O	8/08	**X**		O:8/8		Spare
O	8/09	**X**		O:8/9		Spare
O	8/10	**X**		O:8/10		Spare
O	8/11	**X**		O:8/11		Spare
O	8/12	**X**		O:8/12		Spare
O	8/13	**X**		O:8/13		Spare
O	8/14	**X**		O:8/14	CR2	Fog Light
O	8/15	**X**		O:8/15	CR3	Fog Horn

Slot 9,10 &11 have spacers installed

Rack 1 - Slot 12

I/O	SLT/PO	OFF	ON	ADDRESS	DEVICE	FUNCTION
I	12/00		**X**	I:12.0	CABL1	Cable 1 Analog Tension (R)
I	12/01		**X**	I:12.1	CABL2	Cable 2 Analog Tension (L)
I	12/02		**X**	I:12.2	M2WATTS	Motor M2 Watts
I	12/03		**X**	I:12.3	M2VAR	Motor M2 VARs
I	12/04		**X**	I:12.4	M3 WATTS	Motor M3 Watts
I	12/05		**X**	I:12.5	M2VARs	Motor M3 VARs
I	12/06	**X**		I:12.6		Spare
I	12/07	**X**		I:12.7		Spare
S	12/08		**X**	N/A	N/A	Module Status

Name	Inputs/outputs verified	Comments

No.	Function	Item	Comments	Approv

1.0	**Apron Raise/Lower** The apron shall be raised and lowered a minimum of 10 cylinder extend/retract cycles. 5 cycles shall be controlled via the main control panel on the transfer span and 5 cycles shall be controlled via the remote operator's station on the apron. Four cycles shall demonstrate full apron travel from the extreme up position to the extreme down position. The remaining cycles shall consist of random length cycles typical of those expected to be experienced in service and covering the entire range of apron operation. Verify smooth operation of apron with no binding or unusual noises. Monitor motor current during operation to verify operation within rated range.			
1.1	Actuate the HPU local motor start in the HPU cabinet	47PB		
1.2	Observe the motor starts			
1.3	Verify the PV600 indicates the HPU motor running			
1.4	Verify the motor stops automatically after 30 seconds			
1.5	Verify the PV600 indicates HPU motor stopped			
1.6	Actuate the HPU motor from the local motor start in the HPU cabinet	47PB		
1.7	Observe the motor starts			
1.8	Actuate the HPU local motor stop in the HPU cabinet	48PB		
1.9	Verify the PV600 indicates HPU motor stopped			
1.10	Verify hydraulic motor is not running, and then depress Apron Up pushbutton.	114PB		
1.11	Verify solenoid valve energizes and hydraulic unit starts.	4SV		
1.12	Record Motor currents (each phase) Phase A B C _____			
1.13	Record hydraulic cylinder pressures.			
1.14	Verify Apron raises with no binding or unusual noises.			
1.15	Verify motor stops 30 seconds after releasing Apron Up pushbutton			
1.16				
1.17	With HPU motor off:			
1.18	Depress APRON DOWN pushbutton.	115PB		
1.19	Verify solenoid valve energizes.	5SV		
1.20	Verify Apron Lowers with no binding or unusual noises.			
1.21	Record apron lowering time from full up to full down.			
1.21	Perform 10 cycles, 5 cycles via the main control panel and 5 cycles via the remote operator's station on the apron.			

2.0	**Apron Raise/ Lower** The apron shall be raised and lowered a minimum of 4 cylinder extend/retract cycles using the remote Infrared control. Orientation of the infrared system shall be parallel to the transfer span and operation of the remote control shall simulate an approaching vessel.			
2.1	Actuate the Remote Infrared operator Green pushbutton less than 2 minutes after a transfer span pushbutton actuation.			
2.2	Verify the PV 600 indicates a remote operation attempted.			
2.3	Verify remote operation does not occur.			
2.4	Actuate the Remote Infrared operator Green pushbutton more than 2 minutes after the last transfer span pushbutton has been actuated.			
2.5	Verify the PV 600 indicates a remote operation is in progress			
2.6	Verify the Strobe Light is flashing			
2.7	Actuate the IR remote apron up			
2.8	Verify the apron Goes up			
2.9	Verify the PV600 indicates remote apron up operation			
2.10	Release the IR remote apron up			
2.11	Verify the apron stops			
2.12	Verify the Strobe continues flashing for 10 seconds			
2.13	Actuate the Remote Infrared operator Green pushbutton 2 minutes after the last transfer span pushbutton has been actuated			
2.14	Verify the PV 600 indicates a remote operation is in progress			
2.15	Verify the Strobe Light is flashing			
2.16	Actuate the IR remote apron down			
2.17	Verify the apron Goes down			
2.18	Release the IR remote apron down			
2.19	Verify the apron stops			
2.20	Verify the Strobe continues flashing for 10 seconds			
2.21	Record adjustments made			
2.22	Repeat for four cycles.			
3.0	**Locking Pin Operation** Operate the locking pins via the control panel through 10 complete extend/retract cycles at different elevations along the spans normal range of travel. Verify smooth operation of pins with no binding or unusual noises. Verify Pins In message is displayed on PV600 when the pins are fully extended. Verify Pins Out message is displayed on PV600 when the pins are fully retracted. Verify proper operation of the pump timer.			
3.1	Verify Live Load Pins extended, hydraulic motor is not running and transfer span is resting on the Live Load Pins.			

3.2	Verify PV600 indicates PINS IN			
3.3	Depress the Pins Out pushbutton	116PB		
3.4	Verify no pin operation			
3.5	Raise the Transfer span until the PV600 indicates pins aligned-and manual indication			
3.6	Depress the Pins Out pushbutton	116PB		
3.7	Verify the hydraulic unit motor energizes.	M1		
3.8	Verify the PV600 indicates the HPU motor running			
3.9	Verify the Retract Live Load Pins valve energizes	1SV		
3.10	Verify the PV600 indicates the pins Intermediate positions as pins clear the Pins In sensor			
3.11	Verify the Live Load Pins retract from the hanger bar with no binding or unusual noises. Verify pins do not contact sides of live load hanger fabrication holes.			
3.12	Record pin retract pressure.			
3.13	Verify the PV600 indicates the Pins Out			
3.14	Verify the HPU motor runs for 30 seconds after 116PB has been released			
3.15	Verify the PV600 HPU motor run indication indicates motor stopped.			
3.16				
3.17				
3.18				
3.19				
3.20	Depress the pins In pushbutton	117PB		
3.21	Verify the hydraulic motor energizes	M1		
3.22	Verify the PV600 indicates the HPU motor running			
3.23	Verify the Extend Live Load pins valve energizes	2SV		
3.24	Verify the PV600 indicates the pins Intermediate positions as pins clear the Pins In sensor			
3.25	Verify the Live Load Pins Extend into the Hanger bar with no binding or unusual noises. Verify pins do not contact sides of live load hanger fabrication holes.			
3.26	Record pins extend pressure.			
3.27	Verify the Live Load pins are fully Extended.			
3.28	Verify the PV600 indicates the pins In			
3.29	Verify the HPU motor runs for 30 seconds after the 117PB is released			
3.30	Verify the PV600 indicates the motor stops			
3.31	Repeat test at ten different transfer span positions.			
3.32	With the live load pins extended, and the transfer span resting on the pins:			
3.33	Actuate the pins retract push button	116PB		
3.34	Observe the pins attempt to retract, hold pins out pushbutton for 10seconds			
3.35	Observe the PV600 indicates pins failed to retract			

3.36	Release the pins retract push button	116PB		
3.37	Observe the PV600 indicates pins failed to retract			
3.38	Actuate the pins In Pushbutton	117PB		
3.39	Observe the Pins Extend			
3.40	Observe the PV600 indication restores to normal			
3.41	With the pins retracted align pins to drive the pins into the hanger bar			
3.42	With the pin not align push the pin in Pushbutton	117PB		
3.43	Observe the PV600 indicates pins failed to Extend			
3.44	Actuate the Pins Out Pushbutton	116PB		
3.45	Observe the pins retract			
3.46	Observe the PV600 indication returns to normal			
3.47				
3.48	Record adjustments made.			
3.49				
3.50				
3.51				
4.0	**Apron Float** The apron float function shall be demonstrated a minimum of four times. The apron shall be lowered onto a boat deck. Verify the lever arms fall away from the apron, the float solenoid energizes and apron float is indicated.			
4.1	With the vessel in place:			
4.2	Depress apron down pushbutton	115PB		
4.3	Verify solenoid valve energizes when apron contacts the boat deck.	5SV		
4.4	Verify pressure switch closes.	1PS		
4.5	Verify the PV600 Indicates Float Mode			
4.6	Verify solenoid valve remains energized after down pushbutton is released.	5SV		
4.7	Verify apron lever arms fall away from apron.			
4.8	Raise apron from vessel simulator			
4.9	Observe the pressure sensor opens	1PS		
4.10	Verify down solenoid is de-energized	5SV		
4.11	Verify PV600 no longer indicates float mode.			
4.12	Record adjustments made			
4.13	Repeat test for a total of four times.			
5.0	**Filter Clogged Indication** Simulate filter clogged conditions and verify that the required indications are illuminated and the system operates normally. Perform 2 times.			
5.1	Simulate a clogged filter condition in the return filter.	F2		
5.2				
5.3	Verify the PV600 annunciates Filter Clogged			
5.4				
5.5				
5.6				
5.7	Verify the PLC attempts to send E-mail			

5.8	Verify the system continues to function			
5.9	Clear the filter clogged condition.	F2		
5.10	Verify PV600 filter clogged message clears			
5.11	Record Adjustments made.			
5.12	Simulate a filter clogged condition in the high pressure filter	F1		
5.13	Verify the PV600 annunciates a high pressure filter clogged			
5.14				
5.15	Verify PLC attempts to send an E mail			
5.16				
5.17				
5.18	Verify the system operates			
5.19	Clear the filter clogged condition	F1		
5.20	Verify the PV600 indicates HPU normal			
5.21	Record adjustments made			
6.0	**Low Oil Level** Simulate a low oil condition and verify that the required indications are illuminated and the pump operation is inhibited. Perform 2 times			
6.1	With HPU pump running, simulate a low oil level condition	1FS		
6.2	Verify the PV600 annunciates a Low Oil Level Condition			
6.3	Verify the audible alarm sounds	2AS		
6.4	Verify PLC attempts to send an E mail			
6.5	Verify the HPU pump stops if running and pump start is inhibited			
6.6	Actuate the alarm silence	118PB		
6.7	Verify audible alarm silences			
6.8	Verify PV600 continues to indicate low oil Level			
6.9	Verify pump run is inhibited			
6.10	Clear the simulated Low Oil Condition	1FS		
6.11	Verify the PV600 Low Oil alarm Clears			
6.12	Verify the HPU pump operates normally			
6.13	Record adjustments required			
7.0	**Bridge Raise/Lower (1PBS)** Test bridge raise/lower electric winch operation via the Bridge Control Panel (1PBS) Bridge Up and Bridge Down pushbuttons. Perform two bridge raise/lower operations from extreme up to extreme down to extreme up. Verify smooth starting and operation and correct drum rotation. Monitor motor current to ensure operation within rated range.			
	RECORD BRAKE SETTINGS: Tension as read from top of spring plate to scale. Bell position measured from middle of lower notch to bottom of bell Brake # Tension Bell Position 1 _____ 2 _____ 3 _____			

	4			
7.1	With the pins retracted:			
7.2	Actuate the Bridge up pushbutton	112PB		
7.3	The following motor and brake times are for reference and will be adjusted to allow for smooth transfer span operation.			
7.4	Verify the Drum brakes release immediately			
7.5	Verify the Motor brake releases 50msec after the drum brakes release			
7.6	Verify the VEHICLE TRANSFER SPAN HOIST motor (M2) starts in the Raise direction 0.2 sec after the drum brakes release			
7.7	Verify the Transfer Span raises.			
7.8	Verify the PV600 indicates the brakes released and the hoist motor running			
7.9	Verify pin alignment and PV600 when not measuring for hoist motor current			
7.10	Observe the M2 motor power over the range of the transfer span operation.			
7.11	Observe that hoist motor M3 does not start.			
7.12	Adjust motor M2 power setting to prevent motor M3 to start over the normal operating range.			
7.13	Record motor current up (each phase and power) Phase A B C Power _____			
7.14	Record the time required to travel between proximity switches and Pin Holes: Proximity Switches Pin Holes Average_____ Fastest_____ Slowest_____			
7.15	Release the Bridge up Pushbutton	112PB		
7.16	Verify the motor stops immediately and the motor brake is applied immediately			
7.17	Verify the Drum Brakes set 50msec after the motor stops			
7.18	Adjust motor and brake timing as required for desired span operation.			
7.19	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
7.20	Actuate the Bridge Down pushbutton	113PB		
7.21				
7.22	Verify the Drum Brakes release immediately			
7.23	Verify motor brake release and motor starts 0.2 sec after the drum Brakes release			
7.24	Verify the VEHICLE TRANSFER SPAN HOIST MOTOR (M2) starts in the Lower direction			
7.25	Verify the Transfer Span lowers			

7.26	Verify the PV600 indicates the brakes released and the hoist motor (M2) running			
7.27	Record motor current Down (each phase and power) Phase A B C Power _____			
7.28	Release the Bridge Down Pushbutton	113PB		
7.29	Verify the motor stops immediately and the motor brake is applied immediately			
7.30	Verify the Drum Brakes set 50msec after the motor stops			
7.31	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
7.32	Adjust/set the bridge high limit			
7.33	Open the LCI 100 breaker in the PLC cabinet to allow Hoist Motor M3 to start automatically over the normal range of motion.			
7.34	With the pins retracted:			
7.35	Actuate the Bridge up pushbutton	112PB		
7.36	Verify the Drum brakes release immediately			
7.37	Verify the Motor brake releases .2 sec after the drum brakes release			
7.38	Verify the VEHICLE TRANSFER SPAN HOIST Motors M2 and M3 starts in the Raise direction 0.2 sec after the drum brakes release			
7.39	Verify the Transfer Span raises.			
7.40	Verify the PV600 indicates the brakes released and the hoist motors running			
7.41	Observe that motors M2 and M3 share the load proportionately. (By power measurements) M2_____M3_____			
7.42	Observe that the PV600 indicates both hoist motors running.			
7.43	Release the Bridge up Pushbutton	112PB		
7.44	Verify the motors stop immediately and the motor brake is applied immediately			
7.45	Verify the Drum Brakes set 50msec after the motors stop.			
7.46	Verify the PV600 indicates the brakes set and the hoist motors stopped.			
7.47	Repeat for the lower operation. Verify M3 does not start in the down direction			
7.48	Adjustment Made			
8.0	**Bridge Raise/Lower (Headframe Control Panel (HPB))** Test bridge raise/lower electric winch operation via the head frame Bridge Up and Bridge Down pushbuttons. (Note operation at the headframe control panel bypasses the tension controls and limits hoist operation to the 15 hp motor) Perform two bridge raise/lower operations from extreme up to extreme down to extreme up. Verify smooth starting and operation and correct drum rotation.			

8.1	With the pins retracted			
8.2	Actuate the Bridge up pushbutton	***HPB-12***		
8.3	Verify the VEHICLE TRANSFER SPAN HOIST DRIVE starts in the Raise (M2) direction			
8.4	Verify the Drum brakes release immediately			
8.5	Verify the Motor brake releases 0.2 sec after the drum brakes release			
8.6	Verify the VEHICLE TRANSFER SPAN HOIST DRIVE starts in the Raise direction 0.2 sec after the drum brakes release			
8.7	Observe the transfer Span Rises			
8.8	Verify the PV600 indicates the brakes released and the hoist motor running Observe motor M3 does not start.			
8.9	Release the Bridge up Pushbutton	**HPB-12**		
8.10	Verify the motor stops immediately and the motor brakes are applied immediately			
8.11	Verify the Drum Brakes set 50msec after the motor stops			
8.12	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
8.13	Actuate the Bridge Down pushbutton	HPB-13		
8.14	Verify the VEHICLE TRANSFER SPAN HOIST DRIVE starts in the Lower (M2) direction			
8.15	Verify the Drum Brakes release immediately			
8.16	Verify motor brake release and motor starts 0.2 sec after the drum Brakes release			
8.17	Verify the Transfer Span lowers			
8.18	Verify the PV600 indicates the brakes released and the hoist motor running observe motor M3 does not start			
8.19	Release the Bridge Down Pushbutton	HPB-13		
8.20	Verify the motor stops immediately and the motor brakes are applied immediately			
8.21	Verify the Drum Brakes set 50msec after the motor stops			
8.22	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
8.23	Close the LCI 100 breaker in the PLC cabinet and restore the LCI-100 to normal			
8.24	Actuate the Bridge up pushbutton	***HPB***		

		-12		
8.25	Observe the span does not move			
8.26	Release the Bridge up pushbutton	HPB-12		
8.27	Actuate the Bridge down pushbutton	HPB-13		
8.28	Observe the span does not move			
8.29	Release the Bridge down pushbutton	HPB-13		
8.30				
8.31				
8.32				
8.33	Record adjustments made			
9.0	**Bridge Raise/Lower (Vessel Back Feed)** Test bridge raise/lower electric winch operation via the control panel Bridge Up and Bridge Down pushbuttons when operating from Vessel back feed. Perform two bridge raise/lower operations from extreme up to extreme down to extreme up. Verify smooth starting and operation and correct drum rotation. Monitor motor current to ensure operation within rated range.			
9.1	Check phase rotation at the manual transfer switch.	**MTS-1**		
9.2	Switch transfer switch to vessel power			
9.3	Verify PV600 indicates power from vessel			
9.4	With the pins Retracted			
9.5	Actuate the Bridge up pushbutton	112PB		
9.6	Verify the VEHICLE TRANSFER SPAN HOIST Motor (M2) starts in the Raise direction			
9.7	Verify the Drum brakes release immediately			
9.8	Verify the Motor brake releases 0.2 sec after the drum brakes release			
9.9	Verify the VEHICLE TRANSFER SPAN HOIST Motor starts in the Raise 0.2 sec after the drum brakes release			
9.10	Verify transfer span rises			
9.11	Verify the PV600 indicates the brakes released and the hoist motor running			
9.12	Record motor current up (each phase and power) Phase A B C Power _____			
9.13	Release the Bridge up Pushbutton	112PB		
9.14	Verify the motor stops immediately and the motor brakes are applied immediately			
9.15	Verify the Drum Brakes set 50msec after the motor stops			
9.16	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
9.17	Actuate the Bridge Down pushbutton	113PB		
9.18	Verify the VEHICLE TRANSFER SPAN HOIST Motor (M2) starts in the Lower direction			

9.19	Verify the Drum Brakes release immediately			
9.20	Verify motor brake release and motor starts 0.2 sec after the drum Brakes release			
9.21	Verify the Transfer Span lowers			
9.22	Verify the PV600 indicates the brakes released and the hoist motor running			
9.23	Record motor current down (each phase and power) Phase A B C Power _____			
9.24	Release the Bridge Down Pushbutton	113PB		
9.25	Verify the motor stops immediately and the motor brakes are applied immediately			
9.26	Verify the Drum Brakes set 50msec after the motor stops			
9.27	Verify the PV600 indicates the brakes set and the hoist motor stopped.			
9.28	Record adjustments made			
9.29		MTS		
9.30	Disable the LCI 100			
9.31	With the pins Retracted:			
9.32	Actuate the Bridge up pushbutton	112PB		
9.33	Verify the Drum brakes release immediately			
9.34	Verify the Motor brake releases 0.2 sec after the drum brakes release			
9.35	Verify the VEHICLE TRANSFER SPAN HOIST Motor (M2) starts in the Raise direction 0.2 sec after the drum brakes release			
9.36	Verify the Transfer Span raises.			
9.37	Verify the PV600 indicates the brakes released and the hoist motor running			
9.38	Observe that the Hoist Motor M3 does not start automatically.			
9.39	Repeat for motor lower.			
9.40	Reset the LCI 100 to normal.			
9.41	With the hoist motor running in the raise direction:			
9.42	Start the HPU pump by actuating the apron up Pushbutton			
9.43	Observe the HPU does not start the apron does not move.			
9.44	Start the HPU by actuating the Pins in Push button			
9.45	Observe the HPU does not start the pins do not move.			
9.46	Repeat for pins extend.			
9.47	Stop the hoist.			
9.48	Start the HPU motor by retracting the LLP's			
9.49	Start the Hoist motor by depressing the bridge up Pushbutton while pins are retracting.			
9.50	Observe the hoist does not start			

9.51	Observe PV600 indicates Pins retracted.			
9.52	Actuate the bridge up push button			
9.53	Observe the HPU motor stops			
9.54	Observe the hoist motor starts immediately after the HPU motor stops and brakes are released and hoist operates normally.			
9.55	Stop the hoist.			
9.56	With the hoist stopped actuate the apron raise			
9.57	Observe the HPU starts and the apron rises.			
9.58	Actuate the Bridge up pushbutton while the apron is rising.			
9.59	Observe the Transfer span does not move the brakes do not release and the hoist motor does not start.			
9.60	Release the Apron up Pushbutton.			
9.61	Observe the apron Stops.			
9.62	Actuate the bridge up push button			
9.63	Observe the HPU motor stops			
9.64	Observe the hoist motor starts immediately after the HPU motor stops and brakes are released and hoist operates normally.			
9.65	Stop the hoist.			
10.0	**Emergency Stop** Operate hydraulic power unit and electric winch. Push Emergency Stop pushbutton on control panel. Verify hydraulic pump and electric winch stop operating and all brakes set immediately. Reset Emergency Stop pushbutton. Verify there is no automatic restart when the emergency stop is reset. Verify normal operation of pump and winch			
10.1	Actuate the Bridge up pushbutton and the apron up pushbutton	***1 1 2 P B***		
10.2	While continuing to hold the bridge and apron pushbuttons, push the Emergency Stop push button	111LB		
10.3	Verify all Transfer Span motion stops immediately			
10.4	Verify that the HPU motor shuts off			
10.5	Verify all hydraulic valves shut			
10.6	Verify all brakes set immediately			
10.7	Verify the PV 600 Indicates emergency stop			
10.8	Verify the PLC attempts to send an E mail			
10.9	Verify the Emergency off Pushbutton is illuminated steady on	111LB		
10.10	Reset the Emergency off	111LB		
10.11	Verify no automatic restarts			
10.12	Verify normal operation			
10.13	Repeat test actuating the Bridge Down and Apron Down pushbuttons instead of the Bridge up and the apron up pushbuttons			

10.14	Record adjustments made			
11.0A	**Motor Overload Stops** Simulate equipment overload. Verify hydraulic pump and electric winch stop operating and all brakes set immediately. Reset overload. Verify there is no automatic restart when the overload is reset. Verify normal operation of pump and winch.			
11.1	Simulate a winch motor overload (M2)	***2OL***		
11.2	Verify all Transfer Span motion stops immediately			
11.3	Verify all Brakes set immediately			
11.4	Verify the PV600 Indicates winch motor M2 overload operated			
11.5	Verify the PLC attempts to send an E-mail			
11.6	Verify the Emergency Off Pushbutton Blinks normally	111LB		
11.7	Verify the winch motor will not restart.			
11.8	Reset the motor overload			
11.9	Observe the hoist motor does not restart.	112PB		
11.10	Disable the LCI 100 so M3 will start automatically.			
11.11	Start the Transfer span by actuating the Bridge up pushbutton.			
11.12	Verify the transfer span operates normally.			
11.13	Observe motor M3 starts automatically.			
11.14	Verify the PV600 Indicates winch motors M2 and M3 operating			
11.15	Simulate a M3 motor overload.			
11.16	Observe the transfer span does not stop. Stop the transfer span	3OL		
11.17	Verify the PV600 indicates motor M3 overload operated			
11.18	Verify the Emergency Off Pushbutton Blinks normally	111LB		
11.19	Verify the PLC attempts to send an E-mail			
11.20	Remove the simulated M3 overload	3OL		
11.21	Verify the PV600 overload indication clears			
11.22	Verify the Emergency off Pushbutton turns off	111LB		
11.23	Simulate an HPU motor overload	1OL		
11.24	Verify the HPU motor stops immediately			
11.25	Verify the Hydraulics valves shut			
11.26	Verify the PV600 indicates an HPU motor overload			
11.27	Verify the Emergency off Pushbutton blinks normally	111LB		
11.28	Verify the PLC attempts to send an E-mail			
11.29	Remove the simulated overload from the HPU motor	1OL		
11.30	Verify the PV600 returns to normal			
11.31	Verify the HPU operates normally			

11.32	Simulate a Brake #1 motor overload	1BOL		
11.33	Observe that the transfer span stops immediately			
11.34	Observe that all brakes set immediately			
11.35	Verify the PV600 indicates brake #1 overload			
11.36	Manually release Brake #1 on the head frame, open brake #1 disconnect and reset brake #1 overload.			
11.37	Verify the PV600 indicates Brake #1 manually released and Brake #1 Overload reset			
11.38	Verify the PLC attempts to send an E-mail			
11.39	Verify that the Transfer span operates normally with the PV600 indicating brake #1 manually released			
11.40				
11.41				
11.42	Reset brake #1 to normal.			
11.43	Observe the PV600 indication returns to normal			
11.44	Observe the Transfer Span operates normally.			
11.45	Repeat for brakes 2,3 &4.			
11.46	Adjustments made			
12.0	**Hanger bar alarm and pin auto retract** Verify the following occurs in sequence: sounding of alarm bell and illumination of Hanger Bar Alarm on the PV600, automatic retraction of pins, dropping of hanger bars, silencing of alarm bell and extinguishing of Hanger Bar Alarm indication, and sounding of sonalert alarm. Push Hanger Bar Alarm pushbutton on control panel. Verify Sonalert alarm is silenced. Repeat test with right hanger bar alarm and right pin auto retract limit switches disabled			
12.1	With the live load pins inserted into the hanger bar, actuate the Bridge up pushbutton	112PB		
12.2	Observe the pins raise the Hanger bar			
12.3	Verify that the Transfer span stops automatically and all brakes are set immediately when the hanger bar reaches the hanger bar alarm proximity switch---caution observe hanger bar pin does not reach lower edge of top hanger hole)			
12.4	Verify local audible alarm sounds	2AS		
12.5	Verify PV600 indicates hanger bar alarm			
12.6	Verify the PLC attempts to send an E-mail			
12.7	Observe which proximity alarm has actuated	6LS/7LS		
12.8	Actuate second proximity switch by making the required adjustments			
12.9	Actuate the alarm silence pushbutton	118PB		
12.10	Observe the local audible alarm is silenced			
12.11	Actuate the Hanger bar S/D	8LS		
12.12	Observe the Local audible alarm and the alarm bell are activated	1AS/2AS		
12.13	Observe the pins retract and the hanger bar drops			
12.14	Observe the alarms continue to annunciate			
12.15	Verify the PLC attempts to send an E-mail			

12.16	Actuate the alarm silence	118PB		
12.17	Observe the alarm is silenced and the Span is normal with the pins retracted.			
12.18	Repeat for 9LS			
12.19	Adjustments made			
13.0	**Demonstrate emergency operation**.			
13.1	Raise bridge to center live load pins in hanger bar slots			
13.2	retract pins using manual pump			
13.3	extend pins using manual pump			
13.4	Demonstrate manual lowering of apron onto the vessel deck and manual raising of apron lever arms			
13.5	Record adjustments made			
14.0	**High Bridge Limit Switch**			
14.1	Actuate the Bridge up pushbutton	112PB		
14.2	Observe the Transfer span raises			
14.3	Raise the transfer span until the high limit switch is actuated			
14.4	Observe the Transfer span stops immediately			
14.5	Observe the brakes set immediately			
14.6				
14.7	Verify the PLC attempts to send an E-mail			
14.8	Verify the PV600 indicates a bridge high Limit Shutdown, the hoist has stopped and the brakes set			
14.9				
14.10				
14.11				
14.12	Actuate the Bridge down pushbutton	113PB		
14.13	Observe the bridge lowers			
14.14	Verify the PV600 indication returns to normal operation			
15.0	**Tension Link** Verify automatic shutdowns and failure indications of the line tension system. Repeat for 6 cycles			
15.1	Determine the average tension setting by operating the transfer span at the low end of the transfer span operating range by raising and lowering the transfer span three times through the low range			
15.2	Determine the average tension setting by operating the transfer span at the middle of the transfer span operating range by raising and lowering the transfer span three times through the mid range			
15.3	Determine the average tension setting by operating the transfer span at the high end of the transfer span operating range by raising and			

	lowering the transfer span three times through the high range			
15.4	Set the High and low cable settings as determined from the three previous steps.			
15.5	With the pins retracted			
15.6	Simulate a high tension condition by setting the high tension set point to 1200# ensure this is above the low and low-low tension set points			
15.7	Actuate the Bridge Up pushbutton	112PB		
15.8	Observe that the Bridge does not move			
15.9	Observe that the local audible alarm is actuated	2AS		
15.10	Observe that the PV600 annunciates a high tension alarm			
15.11	Verify the cable high tension counter increments by one			
15.12	Actuate the alarm Silence pushbutton	118PB		
15.13	Observe the audible alarm is silenced			
15.14	Verify that the PLC attempts to send an E-mail			
15.15	Verify that the PV600 continues to annunciate a high tension alarm			
15.16	Verify that the bridge will move down			
15.17	Verify the PV600 continues to indicate high tension			
15.18	Clear the high tension alarm by resetting the cable high tension set point to allow normal operation			
15.19	Verify the PV600 no longer annunciates high tension			
15.20	Verify the bridge operates normally			
15.21	Repeat for both cables			
15.22	Simulate a low tension condition by setting the low tension setting above the actual cable setting ensure this is below the high tension set points			
15.23	Actuate the Bridge Down pushbutton	113PB		
15.24	Observe that the Bridge does not move			
15.25	Observe that the local audible alarm is actuated	2AS		
15.26	Observe that the PV600 annunciates a low tension alarm and the cable tension			
15.27	Verify that the cable high tension counter does not change			
15.28	Actuate the alarm Silence pushbutton	118PB		
15.29	Observe the audible alarm is silenced			
15.30	Verify that the PLC attempts to send an E-mail			
15.31	Verify that the PV600 continues to annunciate a low tension alarm			
15.32	Verify that the bridge will move up			
15.33	Verify the PV600 continues to indicate low tension			
15.34	Clear the low tension alarm by resetting the cable low tension set point to allow normal operation			
15.35	Verify the PV600 no longer annunciates low tension			

15.36	Verify the bridge operates normally			
15.37	Repeat for both cables			
15.38	Simulate a low-low tension condition by setting the low-low tension setting above the actual cable setting ensure this is below the low and high tension set points			
15.39	Actuate the Bridge Down pushbutton	113PB		
15.40	Observe that the Bridge does not move			
15.41	Observe that the local audible alarm is actuated	2AS		
15.42	Observe that the PV600 annunciates a low-low tension alarm and the cable tension			
15.43	Verify that the cable high tension counter does not change			
15.44	Actuate the alarm Silence pushbutton	118PB		
15.45	Observe the audible alarm is silenced			
15.46	Verify that the PLC attempts to send an E-mail			
15.47	Verify that the PV600 continues to annunciate a low-low tension alarm			
15.48	Verify that the bridge will move up			
15.49	Verify the PV600 continues to indicate low-low tension			
15.50	Clear the low-low tension alarm by resetting the cable low-low tension set point to allow normal operation			
15.51	Verify the PV600 no longer annunciates low-low tension			
15.52	Verify the bridge operates normally			
15.53	Repeat for both cables			
15.54	With the transfer span in the Mid travel range and pins inserted			
15.55	Adjust the cable tension for a 500 pound differential			
15.56	Retract the Live load pins			
15.57	Observe the local alarm annunciates	2AS		
15.58	Verify the PV600 indicates a cable differential warning.			
15.59	Verify the PLC attempts to send an E-mail			
15.60	Actuate the Alarm Silence	118PB		
15.61	Observe the PV600 continues to indicate a cable differential warning.			
15.62	Operate the span in the up and down direction			
15.63	Observe the span operates normally			
15.64	Extend the Live load pins			
15.65	Observe the local alarm annunciates	2AS		
15.66	With the pins extended:			
15.67	Lower the transfer span on the pins to determine if the low tension provides an automatic shutdown. Caution: do not allow the hoist cable to become unspooled. Adjust the low-tension settings until			

	the hoist shuts down automatically with minimal slack in the hoist cable Note this may also require adjusting brake timing.			
15.68	Verify that the PV600 does not annunciate a low tension alarm			
15.69	Verify the PLC does not attempt to send an E-mail			
15.70	With the pins retracted and the vessel simulator in place:			
15.71	Lower the transfer span and apron onto the simulated vessel deck to determine if the low-low tension provides an automatic shutdown while allowing the transfer span to be adjusted to the vessel. Caution: do not allow the hoist cable to become unspooled. Adjust the low-low tension settings until the hoist shuts down automatically with minimal slack in the hoist cable Note this may also require adjusting brake timing.			
15.72	Verify that the PV600 does not annunciate a low tension alarm			
15.74	Verify the PLC does not attempt to send an E-mail			
16.0	**Independent Brake Tests** Demonstrate that the motor brake alone, or the drum brakes alone are sufficient to stop and hold the span			
	RECORD BRAKE SETTINGS: Tension as read from top of spring plate to scale. Bell position measured from middle of lower notch to bottom of bell Brake # Tension Bell Position 1 _____ 2 _____ 3 _____ 4 _____			
16.1	With the drum brakes manually held open (Manually engage the brake motor contactors in t MCP cabinet) and the motor brake in its normal operating position, raise the span.			
16.2	Stop the span by releasing the raise span pushbutton.			
16.3	Verify that the motor brake smoothly stops the span and holds the load.			
16.4	Record the maximum transient tension seen in the LH hoist cable as a result of braking			
16.5	Record the maximum transient tension seen in the RH hoist cable as a result of braking			
16.6	With the drum brakes manually held open (Manually engage the brake motor contactors in t MCP cabinet) and the motor brake in its normal operating position, lower the span.			
16.7	Stop the span by releasing the lower span			

	pushbutton.			
16.8	Verify that the motor brake smoothly stops the span and holds the load.			
16.9	Record the maximum transient tension seen in the LH hoist cable as a result of braking			
16.10	Record the maximum transient tension seen in the RH hoist cable as a result of braking			
16.11	With the motor brake manually held open (pull the motor brake manual release and hold) and the drum brakes in their normal position, raise the span.			
16.12	Stop the span by releasing the raise span pushbutton.			
CAUTION VISUAL AND DIRECT COMMUNICATION WILL NEED TO BE MAINTAINED BETWEEN THE TEST COORDINATOR AND THE MOTOR BRAKE OPERATOR TO ENSURE THAT THE MOTOR BRAKE MAY BE INGAGED TO BACKUP THE DRUM BRAKES IF REQUIRED.				
16.13	Verify that the drum brakes smoothly stop the span and hold the load. Release The motor brake			
16.14	Record the maximum transient tension seen in the LH hoist cable as a result of braking			
16.15	Record the maximum transient tension seen in the RH hoist cable as a result of braking			
	RECORD BRAKE SETTINGS: Tension as read from top of spring plate to scale. Bell position measured from middle of lower notch to bottom of bell Brake # Tension Bell Position 1 _____ 2 _____ 3 _____ 4 _____ CAUTION: STOP THE TEST IF BELL RAISES PAST SECOND NOTCH OR LOWERS BELOW BOTTOM OF FIRST NOTCH			
16.16	With the motor brake manually held open (pull the motor brake manual release and hold) and the drum brakes in their normal position, lower the span.			
16.17	Stop the span by releasing the lower span pushbutton.			
16.18	Verify that the drum brakes smoothly stop the span and hold the load.			
16.19	Record the maximum transient tension seen in the LH hoist cable as a result of braking			
16.20	Record the maximum transient tension seen in the RH hoist cable as a result of braking			

	RECORD BRAKE SETTINGS: Tension as read from top of spring plate to scale. Bell position measured from middle of lower notch to bottom of bell Brake # Tension Bell Position 1 _____ 2 _____ 3 _____ 4 _____ CAUTION: STOP THE TEST IF BELL RAISES PAST SECOND NOTCH OR LOWERS BELOW BOTTOM OF FIRST NOTCH			
17.0	**Bridge Adjustment with Live Load** Simulate load of an off center HS-25 vehicle on the span and demonstrate bridge adjustment- **Not Required**			
18.0	**Counterweight support tests**			
18.1	Verify counterweight rope deweighting system used for wire rope inspections.			
18.2	Lower bridge to a position in which the counterweights are clear of the counterweight support system mounted on the towers.			
18.3	Lower the RH counterweight support using the hand winch provided.			
18.4	Raise the bridge to allow the RH counterweight to rest on the support.			
18.5	Continue raising the bridge to the next live load pin hole.			
18.6	Record motor amperage while raising.			
18.7	Insert pins and lower bridge onto hanger bar.			
18.8	Record motor amperage while lowering.			
18.9	While ensuring the counterweight rope does not jump out of the sheave groove, lower bridge to lift counterweight off the support.			
18.10	Continue lowering bridge until support stowage area is clear.			
18.11	Stow the counterweight support using the hand winch and secure with a bolt.			
18.12	Repeat test using LH counterweight support.			
19.0	**Work Light Control** Verify head frame work lights operate using the attendant's control station and the head frame light control switch.			
19.1	Switch lights on at 2PBS			
19.2	Observe light go on.			
19.3	Switch lights off			
19.4	Observe lights go off			
19.5	On the Head frame turn light on			
19.6	Observe light go on			
19.7	Turn lights off			

19.8	Observe lights go off			
19.9	Repeat turning light on/off from different locations			
20.0	**Fog Horn** Verify fog horn operates using the attendant's control station.			
20.1	Switch fog horn on			
20.2	Observe fog horn sounds			
20.3	Switch fog horn off			

Payment

The lump sum contract price for the "Mechanical and Controls Integration" shall be full compensation for all labor, equipment and material necessary to accomplish the work as specified.

2. Page 28, line 46 through page 30, line 27 is replaced with:
(******)

BUBBLE CURTAIN

Description

Design, furnish, install, and operate a bubble curtain system to attenuate underwater sounds (pressures) caused by pile driving. The primary requirement is that the piling shall be completely engulfed in bubbles during impact pile driving, including proofing, except as noted herein.

The State, at its own expense, will conduct hydroacoustic monitoring in and around the work area during pile driving, for the purpose of documenting the performance of the bubble curtain. Contractor shall coordinate the integration of the State's testing program into the pile driving schedule and perform work in support of the program as specified under Special Provision **HYDROACOUSTIC MONITORING PROGRAM**.

Construction Requirements

The bubble curtain system shall consist of one or more compressors with power source; primary and secondary feed lines; distribution manifold(s) with valves, air pressure gauges and flow meters; bubbler manifolds; appurtenant fittings and deployment gear, all as described below.

Bubble Curtain Performance Criteria:

A. Piling shall be completely engulfed in bubbles over the full depth of the water column at all times when an impact pile driver is in use, except when specifically directed otherwise by the Engineer for the purposes of monitoring baseline sound (pressure) levels. Bubbles are not required during vibratory pile driving.

B. Air shall be delivered from bubbler manifold assemblies ("bubblers") located on the seafloor and at intervals not exceeding ten (10) feet between the water surface and the seafloor. Bubblers shall be adequately

weighted and supported to hold position vertically and horizontally when filled with air (operating) and when not operating.

C. Bubblers shall completely surround the pile. Bubbler minimum dimensions shall be either:

- 5-foot by 5-foot square, or
- 5-foot diameter circle.

D. Bubblers shall be constructed of two-inch (minimum) inside diameter steel pipe with one-sixteenth-inch (1/16”) diameter bubble release holes spaced as indicated on the drawings. Bubblers shall be durable enough to withstand repeated deployment during pile driving and shall be constructed to facilitate underwater setup, knockdown, and reuse on the next pile. Pipe and ferrous metal fittings shall be hot-dip galvanized per ASTM A153, prior to drilling the bubble release holes.

E. One or more compressors shall be provided to supply air in sufficient volume and pressure to self-purge water from the bubblers and maintain the required bubble flux for the duration of pile driving. Compressors shall be of a type that prevents the introduction of oil or fine oil mist by the compressed air into the water. The presence of oil film or sheen on the water surface in the vicinity of the operating bubbler will indicate that Contractor has failed to meet this requirement. Contractor shall immediately stop work until the source of oil film or sheen is identified and corrected.

F. Bubbler feed lines (secondary feed lines) shall be sized taking into account backpressure at the exit point, in-line friction losses and losses through fittings.

G. The system shall provide a minimum bubble flux as follows: Total air volume shall be 16 standard cubic feet per minute (scfm) per lineal foot of bubbler, delivered at 100 psi to the primary feed line. Compressor output shall be distributed to the individual bubblers through a distribution manifold fitted with a valve, pressure gauge and flow meter for each secondary bubbler feed line, and a pressure gauge for the primary feed line. Contractor shall monitor the flow and pressure to each bubbler, and balance as necessary using the valves to maintain constant, uniform air volume through each bubbler for the duration of pile driving. Airflow volume shall be distributed equally to all bubblers and uniformly over the length of each bubbler. Pressure to each bubbler may vary and shall be sufficient to maintain the required flow.

H. Prior to first use of the bubble curtain during pile driving, the fully-assembled system shall be test-operated to demonstrate proper function and to train personnel in the proper balancing of the air flow to the bubblers.

I. At the conclusion of the work, the bubble curtain apparatus, excluding the compressor(s) and primary hose(s), shall become the property of the State. Contractor shall flush the equipment thoroughly with fresh water, drain, palletize, and deliver complete and in working condition to the Eagle Harbor Maintenance Yard on Bainbridge Island. Hoses shall be coiled neatly and tied. Flotation devices, ballast weights, suspension chains or cables, lifting bridles, and other miscellaneous items shall be packed up neatly in appropriate containers. The manifold(s), complete with valves, gauges, and flow meters, shall be packed on pallets in a manner to prevent damage during handling and storage.

Submittals

Contractor shall submit drawings, calculations, and an equipment list for the bubble curtain apparatus, and a written description of the operating sequence and procedure to the Engineer for approval at least three (3) weeks prior to commencement of pile driving. Submittal shall show the physical arrangement, details, function and operational parameters of the bubble curtain system. A professional engineer qualified to design compressed air systems shall seal the submittal.

Payment

The lump sum contract price for "Bubble Curtain" shall be full compensation for all labor, materials, tools, and equipment necessary to fabricate, furnish, install, operate, remove, and deliver to Eagle Harbor the specified items in accordance with the Plans, Standard Specifications and these Special Provisions. The lump sum contract price for "Bubble Curtain" shall include any and all collateral costs associated with pile driving, attributable to use of the bubble curtain.

3. The following Special Provision is added:

(******)

HYDROACOUSTIC MONITORING PROGRAM

Description

During construction, the State will conduct hydroacoustic monitoring to document the performance of the bubble curtain. Contractor shall provide PDA measurement under the Special Provision **PDA MEASUREMENT FOR HYDROACOUSTIC MONITORING**, and shall coordinate with the monitoring process and provide assistance as directed by the Engineer.

Construction Requirements

Ten (10) piling shall be hammer-driven full length to design tip and bearing values, using hammer types as indicated below while being subjected to simultaneous hydroacoustic monitoring and PDA measurement. Piling to be monitored under this section shall be exclusive of four piling designated under Special Provision **DYNAMIC PILE TESTING**. The bubble curtain shall be operated as directed by the Engineer.

Contractor shall provide three hammer types for use during monitoring: air/steam, diesel, and hydraulic. Hammers shall be sized to provide for throttling in the range between 40 and 100 blows per foot at specified ultimate bearing. For piling with no specified ultimate bearing values, assume 200 tons for the purpose of sizing the hammers.

The Engineer will select ten piling for monitoring in accordance with the following table:

PILE SIZE	LOCATION	DRIVE AFTER DATE	WORK PHASE	HAMMER TYPE			APPROX. PENETRATION (FT)
				AIR/ STEAM	DIESEL	HYDRAULIC	
24”	DOLPHIN	7/15/04	1 OR 2	1	1	1	35
24”	MAIN BRIDGE SEAT	7/15/04	2	1	1	1	60
30”	MAIN TOWER	10/1/04	2	NONE	2	NONE	50
36”	MAIN WINGWALL	11/1/04	2	NONE	2	NONE	20

Payment
The unit contract price per day for “Hydroacoustic Monitoring Program” shall be full pay for all costs associated with the hydroacoustic monitoring program, including any and all collateral costs associated with pile driving, attributable to the hydroacoustic monitoring program but exclusive of costs paid for driving steel piling under Special Provision **STEEL PIPE PILES**.

4. The following Special Provision is added:

(******)

PDA MEASUREMENT FOR HYDROACOUSTIC MONITORING

Description
Furnish all materials, labor, tools, equipment, services and incidentals necessary to perform

- Dynamic Pile Testing using the Pile Driving Analyzer® (PDA) on ten piling.
- Dynamic Measurements of pile circumferential strain at locations approximately 20 and 35 ft from the pile top on two piling.
- Dynamic measurements of underwater noise using one channel of the PDA.
- Assist and cooperate with State personnel coordinating hydroacoustic monitoring.

Construction Requirements
1. Industry standard Dynamic Pile Testing in general conformance to the measurement methods of ASTM D4945-00 shall be performed by the Contractor using a PDA with PDA sensors mounted on the pile near the pile top. Verbal field reports and written reports will be based on the PDA Case Method values, including peak axial compressive and tensile stress, peak

measured pile velocity, transfer energy, computed ram stroke for diesel hammers, and estimated soil resistance. These measurements will be made on each of the ten (10) piling in the Hydroacoustic Measurement Program.

2. Dynamic Measurement of circumferential strain in the pile steel during driving. These measurements shall be made using a PDA and coordinated electronically with the standard PDA data collected in Item 1. Such measurements will be made at two locations on each of two piling selected in advance by the State from among in the ten piling in the Hydroacoustic Monitoring Program. At least one location on each pile shall be selected so that circumferential strain can be measured before and after that location enters the water. The subcontractor performing this work shall propose the respective locations of these measurements, with final approval of locations by the Engineer. The contractor and its subcontractor shall be responsible for all coordination and preparation required to provide, install, and use the circumferential strain sensors.

3. Dynamic measurement of underwater noise using a suitable underwater pressure transducer compatible with the PDA such that the data is electronically synchronized and stored with the PDA data. Such measurements are intended to provide an indication of the general characteristic of the pressure on a time scale identical to that used for the standard PDA measurements and to assist with correlation of the PDA measurements with hydroacoustic data collected by the State.

4. The Contractor and its subcontractor will assist and cooperate with the State during installation of the ten piling in the Hydroacoustic Monitoring Program. This assistance and cooperation will include provision of field PDA results pertinent to the conduct of the Program as testing proceeds, records of relevant field observations and test details, and archiving of all test measurements and field notes.

5. A final written report presenting the standard field PDA results plus a summary of basic relevant field and test details shall be provided to the Engineer within three weeks of the conclusion of the field testing.

6. PDA data files (in the PDA's native format) shall be provided to the State on a suitable medium, such as a data CD, together with supporting field notes and other data. Data reduction and analysis beyond that described in Item 5 is not part of this Program. However, the data provided to the state under this Item shall provide sufficient information for a qualified PDA consultant to complete analysis of all the PDA field data, including the circumferential strain data.

7. Restrike is not required for the piling in the Hydroacoustic Measurement Program.

8. The installation, monitoring and presentation of the results of the PDA based services shall be performed by a qualified PDA subcontractor whose name

and qualifications shall be submitted to the Engineer for approval at least 14 days before instrumentation work begins. All personnel who operate the PDA and analyze the PDA data shall have a minimum of three years of experience operating the PDA, and shall have operated the PDA and analyzed the data on at least 5 projects during each of those 3 years. Field personnel performing dynamic measurement shall be under the supervision of a Professional Engineer registered in the state of Washington. Two qualified PDA subcontractors are:

Robert Miner Dynamic Testing
Box 340
Manchester, WA 98353
(360) 871-5480
(360) 871-5483 Fax

GRL and Associates
4535 Renaissance Parkway
Cleveland, OH 44128
(216) 831-6131
(216) 831-0916 Fax

Payment
The unit contract price per day for "PDA Measurement for Hydroacoustic Monitoring" shall be full pay for all costs associated with PDA Measurement for Hydroacoustic Monitoring as specified.

5. On page 122, delete line 37 and replace with the following:

A pre-compression test of the MV and Cone type fenders shall be conducted on each fender to be installed. The compression test shall be concentric and attain the value at the minimum absorbed energy shown above, and shall receive 3rd party verification. Shims noted in the Plans shall be coordinated with their final installed location and condition.

6. On page 122, delete lines 40 through 50 and replace with the following:

The Contractor shall submit product data and shop drawings including installation details of the fender elements to the Engineer for review and approval. Submittals shall be in English. Submittal information for all fenders (except those for the tie up slip wingwalls) shall include:

1. Rubber fender element shop drawing showing weights and dimensions,
2. Location and details of anchor bolts, shims and washers,
3. Element performance curve showing reaction and energy versus deflection,
4. ASTM material test results, certified by an independent agency,
5. Full address of the plant where the elements will be manufactured,
6. Manufacturer qualifications as outlined in the next section,
7. Manufacturer's warranty statement,

8. Location and contact person of rubber manufacturer,
9. Warranty information for 5 years including provisions for replacement,
10. Certification by an independent testing agency certifying that the rubber material corresponds to the requirements of this provision.

7. On page 123, delete lines 1 through 4 and replace with the following:

   The fender manufacturer(s) shall have been in the business of manufacturing molded/bonded, buckling type, rubber marine fenders for at least 10 years and show proof of two installations at US ferry terminal, each having been in service at least five years. Contacts and phone numbers for verification of each installation shall be provided. Manufacturers shall meet requirements of submittals above.

8. On page 126, the following is added after line 33:

   The Contractor shall also re-install selected timber members as shown in the Plans.

9. On page 127, the following is added after line 30:

   All costs to re-install timber and lumber shall be incidental to the unit contract price per MBM for "Timber and Lumber – Treated".

10. On page 132, the following is added after line 16:

   Determination of Bearing Values

   Section 6-05.3(12) is supplemented with the following.

   Section 6-05.3(12) applies only to the piles listed in the Summary below, for those piles noted having a bearing capacity in the Plans.

   Summary of Hammering and Proofing Requirements

   1. Four (4) piles shall receive CAPWAP Dynamic Pile Testing as described in **DYNAMIC PILE TESTING**.
   2. 11 piles (minimum) to 26 piles (maximum) shall receive proof hammering to the ultimate bearing capacity shown in the Plans. The final number of proofed piles will be determined by the Engineer.
   3. 10 piles shall be installed with an impact hammer for the entire installation process.

   See the Special Provisions **BUBBLE CURTAIN** and **HYDROACOUSTIC MONITORING PROGRAM** for additional information and requirements.

11. On page 296, lines 17 and 18 are replaced with:

   5. Mechanical and Controls Integration Tests as described in the Special Provisions **TEMPORARY TRANSFER SPAN MECHANICAL AND CONTROLS INTEGRATION and PERMANENT TRANSFER SPAN MECHANICAL AND CONTROLS INTEGRATION.**

Plans

1. On sheet 7 Items 112 and 113 are added.

2. Plan sheets 31A, 31B, and 31C are added.

3. On sheet 224, Section A as revised by Addendum 4, delete the following note: Maritime International Fenders are not allowed.

4. Plan sheet 267A is added.

4. On sheet 348, change the number for the last BUBBLE NOTE from 11 to 12.

5. On sheet 350, add the following to BUBBLE NOTE 2:
   SEE ONE LINE DIAGRAM SHEET E09.04.

6. On sheet 350, add the following to BUBBLE NOTE 10:
   SEE SHEET E03.04.

7. On sheet 351, on the LIGHT FIXTURE SCHEDULE, for SYM FWV, MORLITE LPL2000 series is added under the MANUFACTURER column.

8. On sheet 351, on the LIGHT FIXTURE SCHEDULE, for SYM W18, Lithonia VGR2 series is added under the MANUFACTURER column.

9. On sheet 351, on the RESTROOM – POWER & SIGNAL FLOOR PLAN: Change the call out for homerun leaving the MPZ to read TO 4PX1, SEE E032.04.

10. On sheet 352, on the One Line diagram for the SIGNAL RISER: Change the size of the conduit homerun leaving TTB from 1¼ inch C.O. to 2 inch C.O.

11. On sheet 390, for Light Fixture D, revise the pole to “Lumec Round Steel Bottleneck Pole, SM6V-20”.

Proposal

1. On page 5 Item number 51 the PLAN QUANTITY is revised to **40.44 MBM**.

2. On page 5 Item number 52 the PLAN QUANTITY is revised to **7.63 MBM**.

3. On page 6 and 7 Items numbers 112 and 113 are added.

All bidders will be required to furnish the Secretary of Transportation with evidence of the receipt of this addendum. This addendum will be incorporated in and made a part of the contract when awarded and when formally executed.

Michael G. Thorne, CEO
Washington State Ferries

Attachment:

Sheets 7, 31A, 31B, 31C, 267A
Pages 1 through 9 of the Proposal have been revised and are attached (Rev. March 17, 2004).